FERMILAB-LU-201

Conditioning Summary

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CONDITIONING SUMMARY
MODULE # 1

FNAL 03/30/92

Conditioning History:

First time

Start Date: 28-may-1991 **End Date:** 5-aug-1992

Second time

Start Date: 13-nov-1991 **End Date:** 11-dec-1992

Num. of HV pulses: 62.29 millions **Pulse length:**60μsec **Target Power:** 7.5 MW

End Spark Rate: Overall 0.044%,

Resonant Frequency

Power on: 804.96 MHz at 26.0^0C temperature

Klystron

Gun V = $-164.9kV$, Gun I = $-131.0A$, Klyst. Vacuum = $3.0\mu A$, after
Gun = 34 Sparks , Window#1 = 13374 sparks, several hours of power on.

Waveguide

pressure = 19.89 PSIA, Window#2 = 8 sparks

Radiation at end of run, at 7.5 MW gradient

Cave 0.703 R/H

Vacuum at end of run

Power on:
Sec.#1 = 2.1×10^{-8} Torr, Sec.#2 = 2.1×10^{-8} Torr, Bridge Coupler
Sec.#3 = 2.0×10^{-8} Torr, Sec.#4 = 1.9×10^{-8} Torr, 1.6×10^{-8} Torr

Power off:
Sec.#1 = 6.9×10^{-9} Torr, Sec.#2 = 7.7×10^{-9} Torr, Bridge Coupler
Sec.#3 = 8.6×10^{-9} Torr, Sec.#4 = 6.6×10^{-9} Torr, 6.4×10^{-9} Torr

CONDITIONING SUMMARY
MODULE # 2

FNAL 03/30/92

Conditioning History:

Start Date: 5-aug-1991 **End Date**: 9-oct-1992

Num. of HV pulses: 45.59 millions **Pulse length**:60μsec **Target Power**: 7.5 MW

End Spark Rate: Overall 0.056%,

Resonant Frequency

Power on: 805.00 MHz at 23.78^0C temperature

Klystron

Gun V = $-165.3kV$, Gun I = $-131.6A$, Klyst. Vacuum = $6.0\mu A$, after
Gun = 6 Sparks , Window#1 = 50484 sparks, several hours of power on.

Waveguide

pressure = 22.07 PSIA, Window#2 = 16962 sparks

Vacuum at end of run

Power on:
Sec.#1 = 7.6×10^{-9} Torr, Sec.#2 = 7.9×10^{-9} Torr, Bridge Coupler
Sec.#3 = 8.8×10^{-9} Torr, Sec.#4 = 8.4×10^{-9} Torr, 8.2×10^{-9} Torr

Power off:
Sec.#1 = 7.1×10^{-9} Torr, Sec.#2 = 7.0×10^{-9} Torr, Bridge Coupler
Sec.#3 = 7.4×10^{-9} Torr, Sec.#4 = 7.2×10^{-9} Torr, 7.4×10^{-9} Torr

CONDITIONING SUMMARY
MODULE # 3

FNAL 03/30/92

Conditioning History:

Start Date: 10-oct-1991 **End Date:** 11-dec-1992

Num. of HV pulses: 26.79 millions **Pulse length:**$60\mu sec$ **Target Power:** 7.5 MW

End Spark Rate: Overall 0.028% Central Bridge Coupler only, less then 0.001%

Resonant Frequency

Power on: 804.983 MHz at 23.3^0C temperature

Klystron

Gun V $= -166.4kV$, Gun I $= -134.5A$, Klyst. Vacuum $= 6.0\mu A$, after
Gun = 2 Sparks , Window#1 = 402 sparks, several hours of power on.

Waveguide

pressure = 19.82 PSIA, Window#2 = 1 sparks

Radiation at end of run, at 7.5 MW gradient

Cave 2.08 R/H

Section#1 4.4 R/H, Section#2 3.0 R/H, Section#3 3.8 R/H, Section#4 7.2 R/H

Vacuum at end of run

Power on:

Sec.#1 $= 1.7 \times 10^{-8}$ Torr,	Sec.#2 $= 2.1 \times 10^{-8}$ Torr,	Bridge Coupler
Sec.#3 $= 1.9 \times 10^{-8}$ Torr,	Sec.#4 $= 3.2 \times 10^{-8}$ Torr,	1.8×10^{-8} Torr

Power off:

Sec.#1 $= 1.1 \times 10^{-8}$ Torr,	Sec.#2 $= 1.5 \times 10^{-8}$ Torr,	Bridge Coupler
Sec.#3 $= 1.2 \times 10^{-8}$ Torr,	Sec.#4 $= 2.6 \times 10^{-8}$ Torr,	1.3×10^{-8} Torr

CONDITIONING SUMMARY
MODULE # 4

FNAL 03/30/92

Conditioning History:

Start Date: 12-dec-1991 **End Date:** 2-jan-1992

Num. of HV pulses: 24.70 millions **Pulse length:**60μsec **Target Power:** 7.5 MW

End Spark Rate:
Overall 0.026%, with 2 boost pulses 120μsec C. B. Coupler only, 0.002%

Resonant Frequency

Power on: 804.951 MHz at 26.0^0C temperature

Klystron

Gun V = $-168.2kV$, Gun I = $-134A$, Klyst. Vacuum = 2.0μA, after
Gun = 3 Sparks , Window#1 = 803 sparks, several hours of power on.

Waveguide

pressure = 19.82 PSIA, Window#2 = 7 sparks

Radiation at end of run, at 7.5 MW gradient

Cave 2.66 R/H

Vacuum at end of run

Power on:
Sec.#1 = 2.0×10^{-8} Torr, Sec.#2 = 1.9×10^{-8} Torr, Bridge Coupler
Sec.#3 = 1.7×10^{-8} Torr, Sec.#4 = 1.8×10^{-8} Torr, 1.6×10^{-8} Torr

CONDITIONING SUMMARY
MODULE # 5

FNAL 02/21/92

Conditioning History:

Start Date: 28-jan-1992 **End Date:** 19-feb-1992

Num. of HV pulses: 26.26 millions **Pulse length:**$60\mu sec$ **Target Power:** 8.0 MW

End Spark Rate: Overall 0.039% Central Bridge Coupler only, 0.002%

Resonant Frequency

Power on: 804.975 MHz at $26.0^0 C$ temperature

Reflection min. at $12\mu sec$. At $30\mu sec$, $\frac{WG.FWD.V.}{WG.RWV.V.} = \frac{1.14Vpk}{0.18Vpk}$ on 7104 scope using filter, see pp 59 in MasLogBook.

Multipactor power levels, based on local pressure maxima:

1) $0.95MW$, 2.1×10^{-8} Torr 2) $1.65MW$, 2.2×10^{-8} Torr

3) $2.74MW$, 3.0×10^{-8} Torr

Klystron

Gun V $= -166.3kV$, Gun I $= -132A$, Klyst. Vacuum $= 1.8\mu A$, after
Gun = 2 Sparks , Window#1 = 1993 sparks, several hours of power on.

Waveguide

pressure = 28.46 PSIA, Window#2 = 6 sparks

Radiation at end of run, at 8.0 MW gradient

Cave 3.16 R/H

Section#1 5.18 R/H, Section#2 8.42 R/H, Section#3 4.29 R/H, Section#4 7.75 R/H

Vacuum at end of run

Power on:
Sec.#1 $= 1.7 \times 10^{-8}$ Torr, Sec.#2 $= 2.1 \times 10^{-8}$ Torr, Bridge Coupler
Sec.#3 $= 2.2 \times 10^{-8}$ Torr, Sec.#4 $= 2.2 \times 10^{-8}$ Torr, 2.6×10^{-8} Torr

Power off:
Sec.#1 $= 1.4 \times 10^{-8}$ Torr, Sec.#2 $= 1.8 \times 10^{-8}$ Torr, Bridge Coupler
Sec.#3 $= 1.9 \times 10^{-8}$ Torr, Sec.#4 $= 1.8 \times 10^{-8}$ Torr, 2.1×10^{-8} Torr

CONDITIONING SUMMARY
MODULE # 6

FNAL 03/12/92

Conditioning History:

Start Date: 21-feb-1992 **End Date**: 6-mar-1992

Num. of HV pulses: 11 millions **Pulse length**:60μsec **Target Power**: 7.1 MW

End Spark Rate: Overall 0.03% Central Bridge Coupler only, no data

Resonant Frequency

Power on: 804.987 MHz at 25.98^0C temperature

Reflection min. at 12μsec. At 30μsec, $\frac{WG.FWD.V.}{WG.RWV.V.} = \frac{1.34Vpk}{0.18Vpk}$ on 7104 scope using filter

Multipactor power levels, based on local pressure maxima:

There are no data on multipactoring levels. This module had a large number of window sparks.

Klystron

Gun V = $-166.3kV$, Gun I = $-132A$, Klyst. Vacuum = 1.8μA, after
Gun = 0 Sparks , Window#1 = 19667 sparks, several hours of power on.

Waveguide

pressure = 28.98 PSIA, Window#2 = 177665 sparks

Radiation at end of run, at 6.5 MW gradient

Cave 1.8 R/H

Section#1 3.87 R/H, Section#2 3.16 R/H, Section#3 3.14 R/H, Section#4 2.69 R/H

Vacuum at end of run

Power on:

Sec.#1 = 1.6×10^{-8} Torr,	Sec.#2 = 1.7×10^{-8} Torr,	Bridge Coupler
Sec.#3 = 1.8×10^{-8} Torr,	Sec.#4 = 1.9×10^{-8} Torr,	2.2×10^{-8} Torr

Power off:

Sec.#1 = 1.1×10^{-8} Torr,	Sec.#2 = 1.9×10^{-8} Torr,	Bridge Coupler
Sec.#3 = 1.2×10^{-8} Torr,	Sec.#4 = 1.5×10^{-8} Torr,	1.2×10^{-8} Torr

CONDITIONING SUMMARY
MODULE # 7

FNAL 03/18/92

Conditioning History:

Start Date: 9-mar-1992 **End Date:** 12-mar-1992

Num. of HV pulses: 3.56 millions **Pulse length:** $60\mu sec$ **Target Power:** 7.5 MW

End Spark Rate: Overall 0.079% Central Bridge Coupler only, no data

Resonant Frequency

Power on: 804.986 MHz at 25.98^0C temperature

Multipactor power levels, based on local pressure maxima:

There are no data on multipactoring levels.

Klystron

Gun V $= -166.4kV$, Gun I $= -132A$, Klyst. Vacuum $= 1.0\mu A$, after
Gun = 0 Sparks , Window#1 = 5463 sparks, several hours of power on.

Waveguide

pressure = 28.11 PSIA, Window#2 = 19 sparks

Radiation at end of run, at 7.5 MW gradient

Cave 3.0 R/H

Vacuum at end of run

Power on:
Sec.#3 $= 2.8 \times 10^{-7}$ Torr,

Brige $= 3.1 \times 10^{-7}$ Torr,

Power off:
Sec.#3 $= 1.2 \times 10^{-7}$ Torr,

Brige $= 1.4 \times 10^{-7}$ Torr,

CONDITIONING SUMMARY
16 CELL MODULE

FNAL 01/20/92

Conditioning History:

Start Date: 03-jan-1992 **End Date**: 16-jan-1992

Num. of HV pulses: 13.80 millions **Pulse length**:60μsec **Target Power**: 2.0 MW

End Spark Rate: Overall 0.05%

Resonant Frequency

Power on: 804.961 MHz at $27.0^0 C$ temperature

Multipactor power levels, based on local pressure maxima:

1) $0.245 MW$, 7.1×10^{-8} Torr 2) $0.32 MW$, 5.5×10^{-8} Torr

3) $0.68 MW$, 3.8×10^{-8} Torr 4) $1.85 MW$, 9.5×10^{-8} Torr

Klystron

Gun V $= -155.0 kV$, Gun I $= -119.8 A$, Klyst. Vacuum $= 1.8 \mu A$, after
Gun = 1 Sparks , Window#1 = 29 sparks, several hours of power on.

Waveguide

pressure = 19.61 PSIA, Window#2 = 2 sparks

Radiation at end of run, at 2.0 MW gradient

Cave 1.22 R/H

Section#1 2.3 R/H, Section#2 6.22 R/H, Section#3 0.55 R/H, Section#4 0.26 R/H

Vacuum at end of run

Power on:
IG.#2 $= 1.1 \times 10^{-7}$ Torr, IG.#3 $= 5.1 \times 10^{-8}$ Torr, Bridge Coupler
IG.#4 $= 5.8 \times 10^{-8}$ Torr, Sec.#4 = ?? $\times 10^{-8}$ Torr, ?? $\times 10^{-8}$ Torr

4 CELL TRANSITION SECTION CONDITIONING SUMMARY

FNAL 01/28/92

Conditioning History:

Start Date: 16-jan-1992 **End Date:** 27-jan-1992

Num. of HV pulses: 1.19 millions **Pulse length:**60μsec **Target Power:** 0.5 MW

End Spark Rate: Overall 0.05% Total num. of sparks 4491

Resonant Frequency

Power on: 804.957 MHz at $27.0^0 C$ temperature

Multipactor power levels, based on local pressure maxima:

1) $< 0.026 MW$, 5.4×10^{-8} Torr 2) $0.037 MW$, 4.1×10^{-8} Torr

3) $0.084 MW$, 4.8×10^{-8} Torr 4) $0.285 MW$, 7.2×10^{-8} Torr

Klystron

Gun V $= -156.2 kV$, Gun I $= -120.4 A$, Klyst. Vacuum $= 1.4 \mu A$, after
Gun = 0 Sparks , Window#1 = 0 sparks, several hours of power on.

Waveguide

pressure = 19.49 PSIA, Window#2 = 1 sparks

Radiation at end of run, at 0.5 MW gradient

Cave 0.65 R/H

Section#1 2.3 R/H, Section#2 6.22 R/H, Section#3 0.55 R/H, Section#4 0.26 R/H

Vacuum at end of run

Power on:
IG.#2 $= 3.7 \times 10^{-8}$ Torr, IG.#3 $= 5.5 \times 10^{-8}$ Torr, Bridge Coupler
IG.#4 $= ?? \times 10^{-8}$ Torr, IG.#5 $= 4.4 \times 10^{-8}$ Torr, $?? \times 10^{-8}$ Torr

Power off:
IG.#2 $= 1.9 \times 10^{-8}$ Torr, IG.#3 $= 2.4 \times 10^{-8}$ Torr, Bridge Coupler
IG.#4 $= ?? \times 10^{-8}$ Torr, IG.#5 $= 1.8 \times 10^{-8}$ Torr, $?? \times 10^{-8}$ Torr

Setup in A0 cave: see over

DEBUNCHER
CONDITIONING SUMMARY

FNAL 07/15/92

Conditioning History:

Start Date: 17-jun-1992 **End Date:** 07-july-1992

Num. of HV pulses: 21.62 millions **Pulse length:**60μsec **Target Power:** 0.2 MW

Resonant Frequency

Power on: 804.9768 MHz at 26.0^0C temperature

Impedance matching: Iris cut for 35 ma beam loading.

Reflection min. at 15.0μsec. At 50μsec, $\frac{WG.FWD.V.}{WG.RWV.V.} = \frac{155.0mVpk}{34.0mVpk}$ on 7104 scope.

Multipactor power levels, based on local pressure maxima:

1) $< 0.088MW$, 1.3×10^{-8} Torr

Klystron

Gun V $= -150.7kV$, Gun I $= -115.2A$, Klyst. Vacuum $= 1.4\mu A$, after Gun = 0 Sparks , Window#1 = 8 sparks,

Waveguide

pressure = 29.05 PSIA, Window#2 = 103 sparks

Radiation at end of run, at 0.088 MW gradient

Cave 0.001 R/H

Vacuum at end of run

Power on:
IG.#1 $= 1.3 \times 10^{-8}$ Torr, IG.#2 $= 1.2 \times 10^{-8}$ Torr

Power off:
IG.#1 $= 5.9 \times 10^{-9}$ Torr, IG.#2 $= 5.4 \times 10^{-9}$ Torr